

# THE BEST IS YET TO COME

**It's time to ... JUMP...into Corequisites!**

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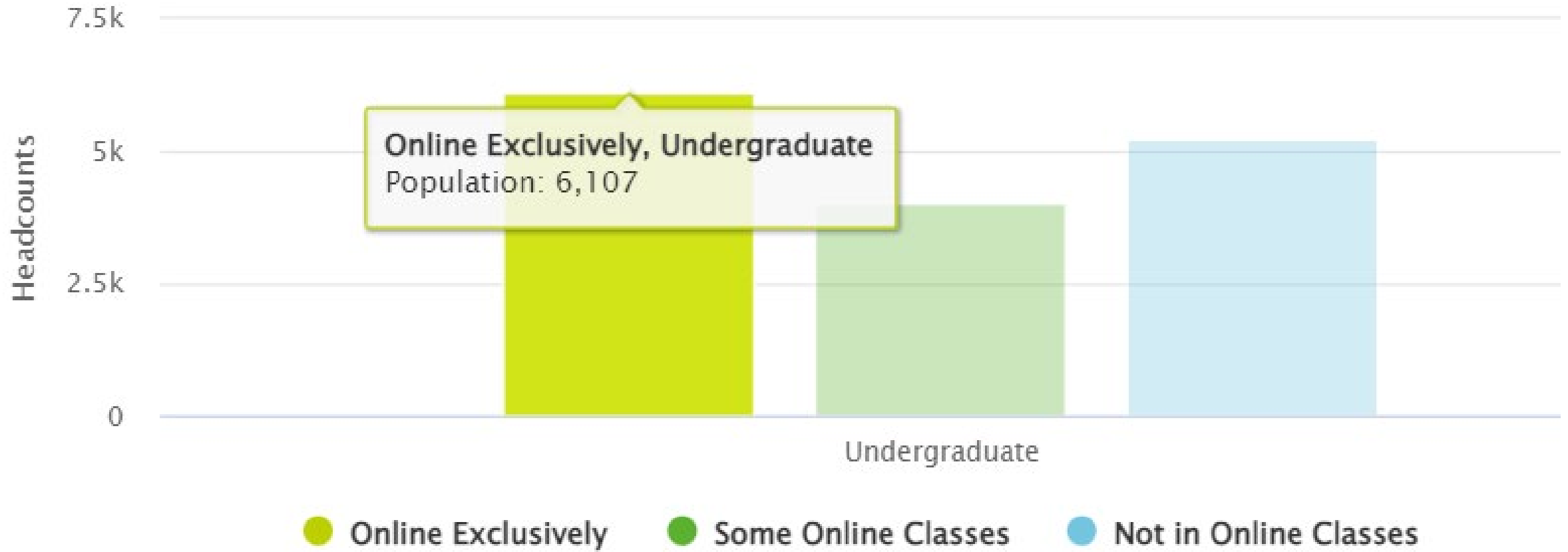
## MY SCHOOL

GEORGIA STATE UNIVERSITY –  
PERIMETER COLLEGE

## Student Demographics (~15,400)

### Student Population By Gender Georgia State University-Perimeter College

	Total	Men	Women
Total	15,353	5,656	9,697
Full-time	5,426	2,223	3,203
Part-time	9,927	3,433	6,494



MY SCHOOL

GEORGIA STATE UNIVERSITY — PERIMETER COLLEGE

# GEORGIA STATE UNIVERSITY — PERIMETER COLLEGE

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	Total	
Total	15,353	5
American Indian/Native American	25	
Asian	1,727	
Black/African American	6,718	
Hispanic	2,079	
Native Hawaiian or Other Pacific Islander	13	
White	3,156	
Two More	784	

# GEORGIA STATE UNIVERSITY – PERIMETER COLLEGE

- American Indian/Native American
- Asian
- Black/African American
- Hispanic
- Native Hawaiian or Other Pacific Islander
- White
- Two More
- Un-Known



# AGE DISTRIBUTION

## GEORGIA STATE UNIVERSITY — PERIMETER COLLEGE

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AGE		
Under 18	1,971	12%
18-19	3,972	25%
20-21	3,166	20%
22-24	2,089	14%
25-29	1,766	11%
30-34	970	6%
35-39	549	4%
40-49	565	4%
50-64	244	2%
Over 64	61	

## DEVELOPMENT OF COREQUISITE SUPPORT IN GEORGIA

- 2009** ● Center on Education and the Workforce Report; Complete College America formed, Complete College GA
- 2012** ● Reduction in levels of developmental math
- 2015** ● Corequisite support and pathways implemented
- 2018** ● Foundations courses eliminated

ITERATIONS!

WOW...IT'S  
NOT EASY...

PERFECTION  
TAKES TIMES

...the joy is in the journey...?

...our administrators hope  
the journey is short



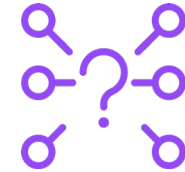
# FLAWS IN OUR DESIGN



**Disconnected from  
the CA course**



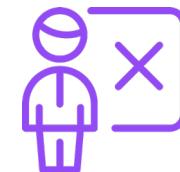
**Overwhelmed  
Students**



**No content for  
students to use**



**Attendance  
Problems in  
corequisite course**



**Rogue Instructors**

Same instructor for both courses

Scheduled back-to-back

Example:

College algebra 10:00 – 11:15 AM

Support for college algebra 11:30AM - 12:20 PM



How do we run the course?

# POSSIBLE GRADING

## Support Course

75% Practice, Practice, Practice

- Reading Assignments (interactive book)
- In-class Questions/group work
- Homework (after class)

25% Final Exam

- (on prerequisite material only)

## College Algebra Course

20% Practice, Practice, Practice

- Reading Assignments (before class)
- In-Class Questions
- Homework (after class)

10% Quizzes/discussions/extras

45% Tests

25% Final Exam

This didn't happen overnight! It didn't happen over one semester.

We have been working to perfect our corequisite course since 2014! At that time, we still had foundation courses.

In 2018 we began our courses without foundation courses! ...back to the drawing board...



How do we run the course?

There is not a right or wrong way to do corequisites. You may be unable to schedule the 2 courses back-to-back or have the same instructor.

The key is to decide on material for each course and create a calendar...and communication!

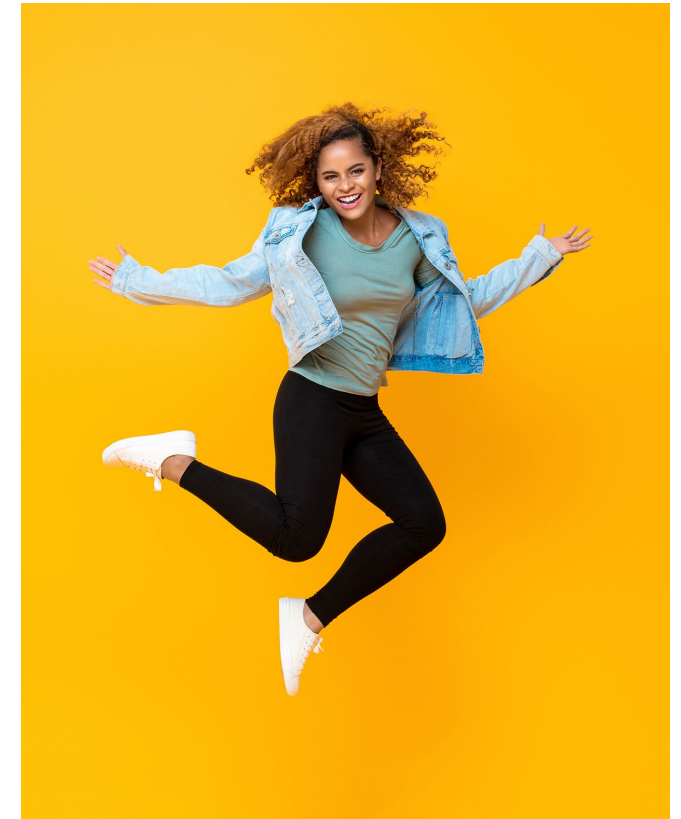


How do we run the course?



# HOW WILL YOU “JUMP” INTO COREQUISITES ?

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HOW WILL YOUR “JUMP”  
LOOK?

Pushed into  
it...mad...with  
steam rolling in  
your head?



HOW WILL YOUR “JUMP”  
LOOK?

...Happy to be  
trying something  
new...





HOW WILL YOUR “JUMP”  
LOOK?

Jumping in with  
both feet  
because you  
“have to”...with  
no direction



WHAT WILL YOUR “JUMP”  
LOOK LIKE?

“Team effort”

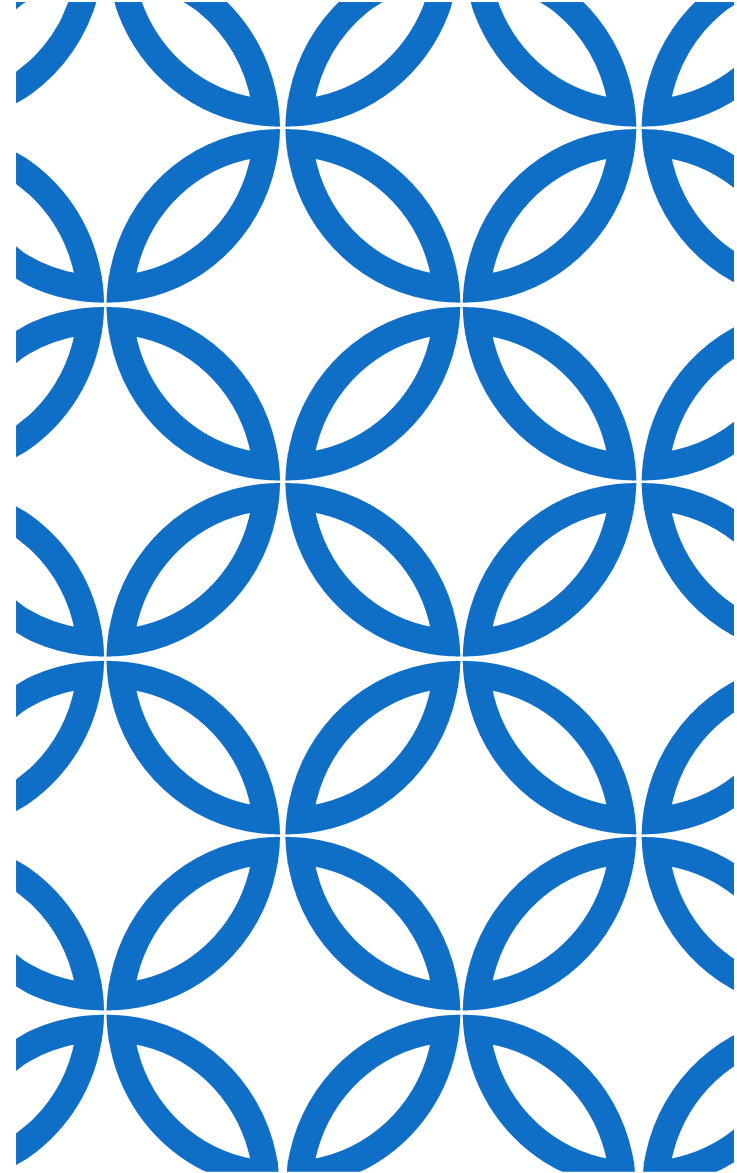
Enjoy the new  
concept and  
learn new things  
with each other



**Some may jump in  
with glee.**

**Others may need  
some help.**



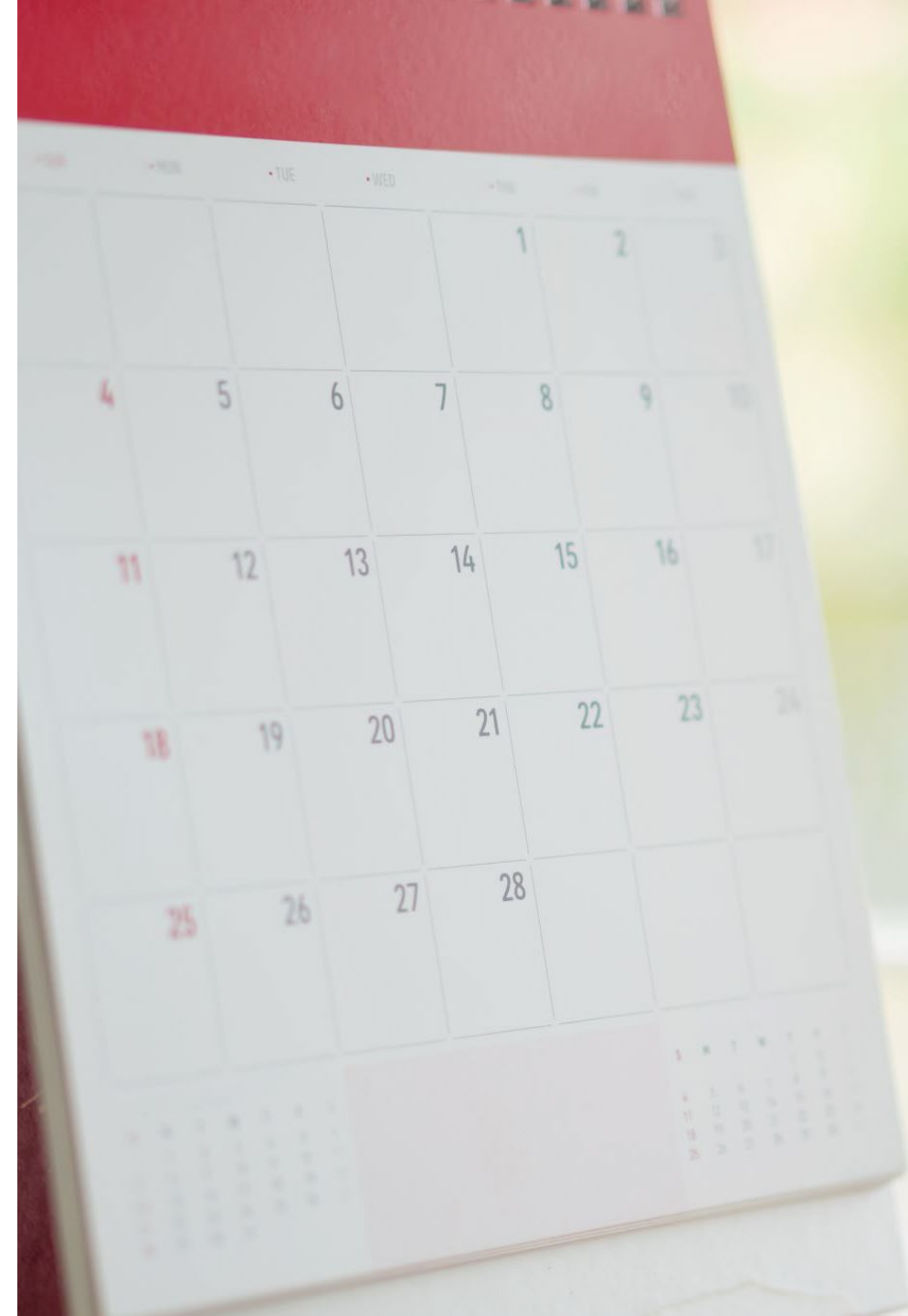


**LET'S SHARE  
SOME IDEAS**

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# COLLABORATE!

- Students should have a similar experience regardless of instructor
- teachers can always add their flair...but some need a little help finding it
- Love your material...get a game plan and help all the teachers fall in love with their resources!



# TRY TO AVOID A “GLORIFIED TUTORING SESSION”

## Structured Learning Experience

They are paying for this course. They deserve more than just a worksheet...but that's a good start.

Students don't do optional!

# DOES THIS CLASS COUNT?

# IS IT WORTH IT?

Were there any issues



Attendance: students thought it didn't matter, especially if the classes weren't scheduled back-to-back.

They deserve content to read, watch and have an instructor to provide a lecture...then the engagement in the class is icing on the cake!

They need a grade for this class!

# THEY NEED TO SEE THE CONNECTION WITH COLLEGE ALGEBRA AND THE COREQUISITE

Keep only the essential material needed to master college algebra. We cannot expect instructors to teach the entire prerequisite course.





**KEEP ONLY THE ESSENTIAL MATERIAL  
...THAT'S NOT EASY!**

Quadratic Equation section is tough! It has SO many prerequisites.

We do the best we can. We are not miracle workers...but we can strive to be.



We began with publishers' worksheets...it was too many worksheets because we were trying to pull from several resources

We created our own worksheets that contained “just enough”

We were still missing the lecture content...book and videos for students that needed to learn from “scratch”.

Worksheets worked okay for on campus, but our online students were still lacking the resources they needed to learn the prerequisites. They didn't have a teacher working through the worksheets with them.







## WE CHANGED BOOKS

Our book was written by a colleague intentionally for our two courses.

- It connected the two courses
- It provided the typical “book content” (examples, videos, and homework problems).
- It contained “mindset” activities
- The e-book worked well for on-campus or on-line.



# THEY NEED TO SEE THE CONNECTION

-  **Section 1 Prerequisite Skills: Lin...** >  
6ð RV • 44 assigned items
-  **Section 1 Core Content: Linear E...** >  
6ð RV • 27 assigned items
-  **Section 2 Prerequisite Skills: Lin...** >  
8ð RV • 20 assigned items
-  **Section 2 Core Content: Linear I...** >  
6ð RV • 22 assigned items
-  **Section 3 Prerequisite Skills: Qu...** >  
6ð RV • 41 assigned items
-  **Section 3 Core Content: Quadr...** >  
6ð RV • 32 assigned items



**We have the advantage of an eBook. We can move sections around to “our” best fit.**

Section 1 Prerequisite Skills: Lin...  
60 RV • 44 assigned items

Study with Purpose: The Forge...  
60 RV • Visible to students

S1 PS Reading Assignment (Tex...  
60 RV • Visible to students

S1 PS Homework Assignment  
60 RV • Visible to students

S1 PS Additional Practice  
60 RV • Visible to students

S1 PS Slide Deck  
60 RV • 40 assigned items

Section 1 Core Content: Linear E...  
60 RV • 27 assigned items

S1 CC Reading Assignment (Te...  
60 RV • Visible to students

S1 CC Homework Assignment  
60 RV • Visible to students

S1 CC Additional Practice  
60 RV • Visible to students

S1 CC Slide Deck  
60 RV • 24 assigned items

Mindset

Book content

Homework problems

Extra

Engagement (polling questions)

Book content

Homework problems

Extra

Engagement (polling questions)



# WHAT'S IMPORTANT FOR “YOUR” JUMP INTO THE COREQUISITE CLASS?

**Fall in love with your book and supplemental material.  
Organize it for BOTH courses**

Find the material in the book that is “just enough” to help students with the prerequisites. Pair it with the topic for College Algebra.

**Jump together:**

Find/create worksheets for practice problems if not provided in the book.

**Engagement in the classroom:**

Encourage instructors to use group work with the worksheets (lecture first though!) or polling questions during the lecture.



# THEY NEED TO SEE THE CONNECTION

## Does the corequisite course tie to the college algebra?

Your thank you note was shared by ~~\_\_\_\_\_~~ who took the following course: MATH 1111 & 0999

Student's Note:

Hello Professor Wetlich,

I just wanted to take a moment to express my sincere gratitude for being an amazing teacher. In the past, I have struggled with math and have had some really boring math teachers, but you were different. You were upbeat, eager to help, and an all-around great individual.

**Not only did you teach two classes at the same time, but you organized it in such a clean and comprehensible way that it had a huge impact on my success and my ability to understand the information. I am extremely grateful for all the resources provided to help the class achieve our goals,** such as recorded videos, test review videos, problem sheets, and live interaction.

Out of all my teachers, YOU were the only one I could say I virtually met and could speak with and ask questions about certain things, just like in a classroom. Your compassion to help students succeed is rare to find because, yes, I have had teachers who were helpful and lenient, but most college teachers just hand out the work and go about their business.

Once again, your caring nature, great teaching, and even insight into learning tactics have been of true service, and I am extremely grateful to have had you as a teacher.

CETLOE would also like to thank you for your dedication to your students and teaching. It's an honor for us to get a glimpse into your



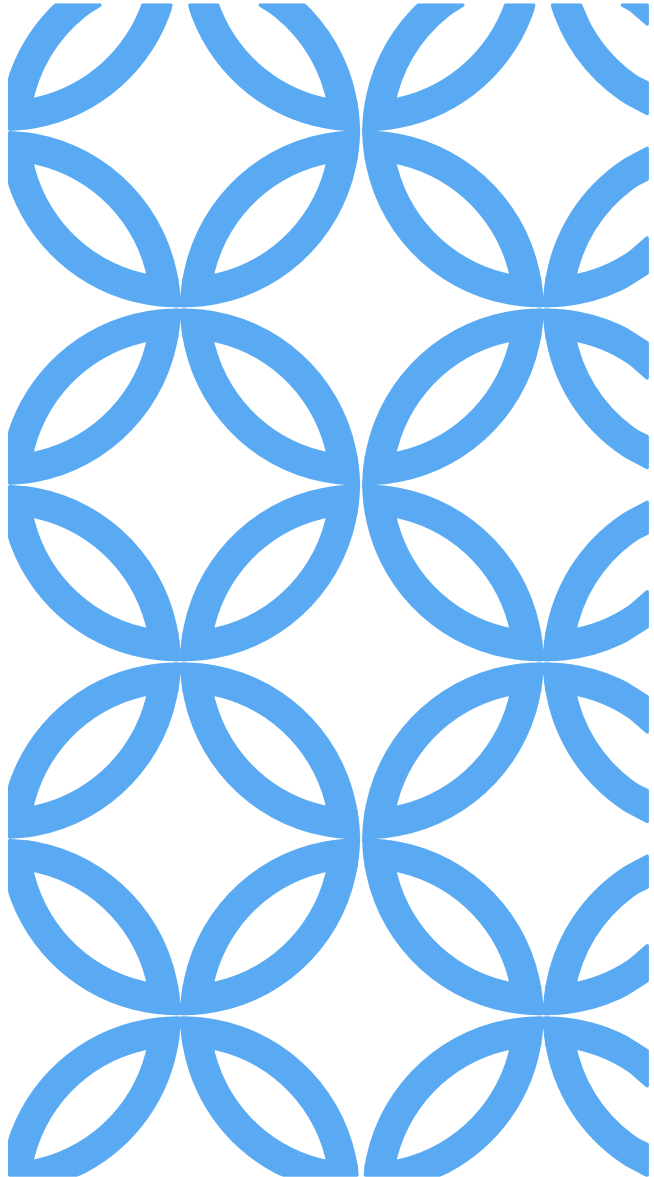
# “OFF THE RECORD”

Why is it that

$$10 + 10 = 11 + 11$$

$$11 + 11 = \textit{twenty too}$$





We need to combine active learning and lecture.

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# HOW MUCH INFORMATION CAN THE BRAIN HOLD?

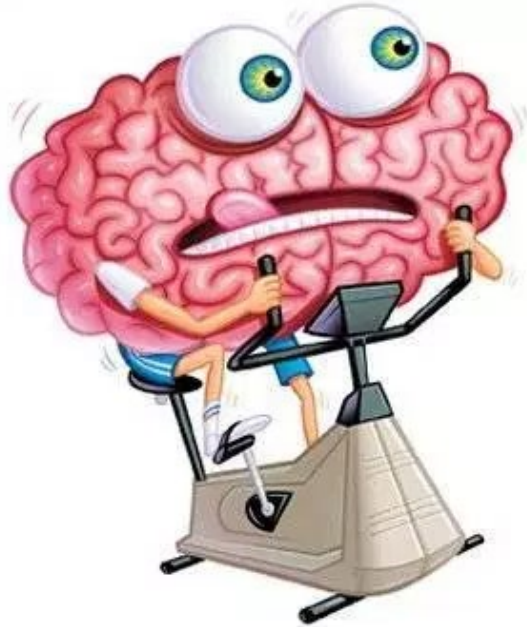
How much soda can this cup hold?



# WHAT HAPPENS WHEN WE “POUR” TOO FAST?



# WHAT HAPPENS TO OUR STUDENTS WHEN WE LECTURE NON-STOP?



What if we poured a little...waited, then poured more?



## Grading Weight

0.5 Correctness 0.5 Participation



## Q6 (10/3) Piecewise-Defined Function

Show Correct Answer

Evaluate  $g(-4)$  given that

$$g(x) = \begin{cases} -4x + 1, & x < -5 \\ -3x - 4, & x \geq -5 \end{cases}$$

A	-16	1
B	-15	2
C	8	17
D	17	2

Perfect Teaching Moment!!!

Students are very focused at this point...they want to know if they got it correct...OR why they didn't



**I have become a fan of polling questions.**

**Group work also gives students time to practice and absorb the prerequisites needed.**



Engagement is a large part of my class now



Students answering a polling question on their laptop or phone





**THEY NEED TO SEE THE CONNECTION**

**You can do each of these in your LMS!**

**Organization is the key to success  
...for us...and our students!**



**SPEAKING OF CONNECTIONS —**

**LET'S TALK ABOUT A FEW TOPICS  
FOR THE COREQUISITE COURSE**



# Rational Equations

## Prerequisite Skills: Rational Equations

To complete the section on Rational Equations, you must have the following prerequisite skills.



[Skill 1: Identify the least common denominator for a set of fractions](#)

[Skill 2: Multiply fractions](#)

[Skill 3: Identify values that make a rational expression undefined](#)



# Rational Equations – students need practice on the prerequisites

## Q8 Multiply fractions

Simplify the product and enter the simplified result in the blank your answer.

$$(x - 2)(x + 3) \left( \frac{9}{x - 2} \right) = \text{_____}$$

## Q12 Values that make a rational expression undefined

**i** Multiple answers: Multiple answers are accepted for this question

Select all values that make the expression undefined.

$$\frac{x}{x^2 - 3x - 4}$$

Pause...  
it's important!

Engagement is  
key too!



## QUICK CHECK



### Quick Check 2: LCD of rational expressions

What is the LCD of rational expressions with the given denominators?

$$x^2 - 6x + 8 \text{ and } 2x - 8$$

# Homework for the corequisite content...

practice makes perfect!



Q9 Evaluate an algebraic expression

Find the value of the expression at  $x = 5$ .

$$\frac{3x - 1}{x + 2}$$

# College Algebra homework

## Objective 2: Apply function notation



Q7 Function notation

Find the value of  $f(2)$  for the given function.

$$f(x) = \frac{1}{2}x + 3$$



Q8 Function notation

Find each function value.

$$f(x) = 2x^2 - 3x + 1$$

a.  $f(0) =$

b.  $f(3) =$

c.  $f(-2) =$

# Prerequisite Skills: Operations and Compositions of Functions



## PREREQUISITE SKILLS

[Skill 1: Perform operations with polynomials](#)

[Skill 2: Simplify a composed expression](#)

[Skill 3: Simplify the numerator of a difference quotient](#)

[Skill 4: Evaluate a function](#)

[Skill 5: Find the domain of a function](#)

# Core Content: Operations and Compositions of Functions



## OBJECTIVES

[Objective 1: Perform operations on functions](#)

[Objective 2: Simplify a difference quotient](#)

[Objective 3: Compose functions](#)

[Objective 4: Solve applications of operations and compositions of functions](#)



## Corequisite homework

### Skill 2: Simplify a composed expression



Q7 Simplify a composed expression

Simplify the expression. Enter the simplified form in standard form. Use ^ to spaces in your answer.

$$8(9x - 7) - 4$$

**The students didn't know that  $g(x) = 9x - 7$**

## Corequisite homework

### Q2 Opposite of a polynomial

Simplify each expression. To denote an exponent, use  $^$  ;

polynomial.

a.  $-(x - 2) =$

b.  $-(3 - x) =$

c.  $-(2x^2 - 3x + 1) =$

### Q3 Opposite of a polynomial

Determine the opposite of the polynomial.

$$-5x^3 - 6x^2 + 3x - 1$$

<b>A</b>	$5x^3 - 6x^2 + 3x - 1$
<b>B</b>	$-5x^3 + 6x^2 + 3x - 1$

# College Algebra homework



## Q11 Even and odd functions

Fill in each blank with the simplified expression or appropriate word. Use ^ to denote powers.  
your answers.

1.  $f(x) = x^4 - 2x^2 - 8$

a.  $f(-x) =$

b. Is the function even, odd, or neither?

2.  $f(x) = -3x^5 + x^3 + 2x$

a.  $f(-x) =$

# Corequisite homework

 Q3 Operations on polynomials

Simplify each expression. Enter the simplified answer in standard form. Use spaces in your answers.

a.  $(4x^2 + 2x - 6) + (3x^2 - 7x - 6) =$

b.  $(4x^2 + 2x - 6) - (3x^2 - 7x - 6) =$



**The students didn't know that**

$$f(x) = 4x^2 + 2x - 6 \text{ and } g(x) = 3x^2 - 7x - 6$$

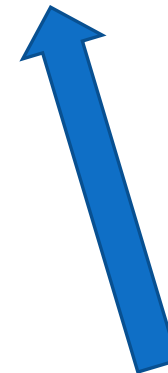
# College Algebra homework

## Objective 1: Perform operations on functions



Q3 Operations on functions

Let  $f(x) = -2x + 5$  and  $g(x) = 4x - 1$ . Find  $(g - f)(x)$ .



## Corequisite homework



Q8 Simplify a composed expression

Simplify the expression.

$$(x - 5)^2 - 2(x - 5) + 1$$

**The students didn't know that  $g(x) = x - 5$**

Corequisite material needs to be just enough,  
and the student need to see connection.

Engagement is just good teaching technique  
(whether that is group work or polling  
questions)

# MINDSET AND EXTRAS

Can you insert mindset reading into your LMS or assign from your book? Sometimes our students need help learning how to be students!

Have you heard about exam wrappers? These are great to help students to reflect!





## STUDY WITH PURPOSE

Learning math is similar to learning a foreign language; it requires knowing how to speak, read, and write the "language" fluently to communicate and understand the concepts. Learning new ideas can be complex and challenging, but this is essential for learning to take place. Educators often refer to this struggle as a *productive struggle* or a *desirable difficulty*.



Figure 1. A student overwhelmed with her studies. [1]

There are scientifically proven methods that you can apply to learn new material. The *Study with Purpose* lessons will present several of these throughout the course. *Spaced repetition* is one method that can improve learning. **Spaced repetition** is a learning process that increases intervals of time between the review of previously learned material. If we fail to revisit a new skill regularly, we will forget that skill. For learning to take place, forgetting must be interrupted.

The Curve of Forgetting (Figure 2) shows the percent of the material retained each day after learning a new concept. Notice that three days after learning the information, we forget nearly half of it if we do not review it. However, the graph shows that regularly studying the material for several days helps us retain almost 90% of what we learned after a week.

Typical Forgetting Curve for Newly Learned Information

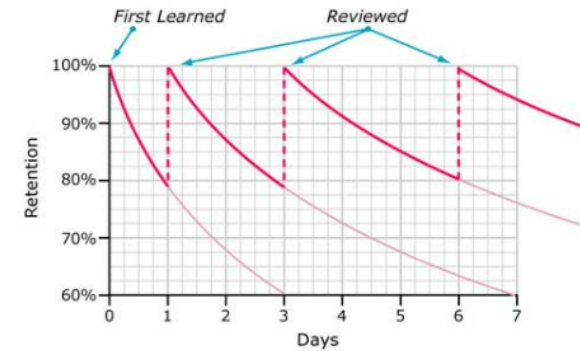


Figure 2. The curve of forgetting. [2]

## Core Content: Rational Equations

This section will present how to solve a new type of equation, a *rational equation*. A rational equation is an equation that contains at least one rational expression, that is, a quotient, or ratio, of polynomials. Rational equations arise in real-world applications involving rates, distance, and work problems. We calculate distance and work by multiplying a rate and a time. For instance, the total distance traveled ( $d$ ) is given by  $d = rt$ , where  $r$  is the rate or speed, and  $t$  is the time traveled. The amount of work done ( $W$ ) is  $W = rt$ , where  $r$  is the rate of work, and  $t$  is the time spent working. Rational expressions and rational equations arise when we need to solve for the rate or time.



# We don't expect an answer...



**THINK ABOUT IT!**

Brianna and Aisha start a small business making handmade soaps to sell at fairs and local stores. Brianna can make 50 bars of soap in 40 hours, and Aisha can make 50 bars of soap in 75 hours.



**Think About It: Rational Equations**

How long do you think it will take Brianna and Aisha to make 50 bars of soap if they work together? Explain your reasoning.



## THINK ABOUT IT!



### S4 Elaborate and connect

A strategy from learning science for retaining material is to write a summary of things you have learned and to note how this new information relates to prior knowledge. Take a few moments to answer the following questions or write a summary of what you have learned from this section.

- How can you recognize a rational equation?
- What process do we use to solve a rational equation?
- How can you determine if a solution is an extraneous solution?
- If the only solution of a rational equation is extraneous, what is the solution set of the rational equation?
- How are rational equations similar to linear and quadratic equations?
- If you know how long it takes two people to complete a job working alone, how can you find the time it takes them to complete the job working together?
- How do rational equations differ from linear and quadratic equations?
- How can you connect the concepts in this section to previous topics you have learned?



# IMPACT TO COLLEGE ALGEBRA

Our college algebra students benefited from the “extras” we used for the corequisite course.

- “Think about it”
- “Elaborate and connect”
- Interactive classroom: Polling questions and/or review worksheets

Teachers gained a few new teaching techniques too!

# SUM IT UP

## 1. See the Connection!

- Decide **prerequisite topics** needed for each section of college algebra

## 2. Lecture and Engagement during class:

- Create/or find publisher worksheets to match each section
  - use these for your lecture guide or group work or both
  - Optional: Create polling questions that match lecture guide (insert these into your lecture every 10 or 15 minutes)

## 3. Practice the prerequisite skills: Create homework assignments for corequisite course.

## 4. Helpful: Find mindset information. It can be a quick read to get students' thinking.

## 5. Other: Communicate with your colleagues. Create calendar for a general guide. Establish grading criteria for corequisite course.

# DOES EVERYONE SUCCEED?

**No, we can't capture everyone...**

**but can we capture more than before?**

# Work with your colleagues and map a plan



**Imagine a successful launch...  
the best is yet to come!**





WHAT WILL YOUR  
“JUMP” LOOK LIKE?

Hopefully, you  
can smell the  
flowers along the  
way without  
wanting to pounce  
on anyone



# QUESTIONS

We work with what we have...

1. How are your courses scheduled?
2. Do you have material for the corequisite?
3. How will your grading be structured?

# THE BEST IS YET TO COME

**It's time to ... JUMP...into Corequisites**

Sharon Weltlich

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